Development of Tools for Children's Risk Assessment Based upon Life-Stage–Specific Exposure

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Keywords: exposure, children, risk, exposure factors, risk assessment

Issue

What critical information is needed to fully define exposure and contributors to exposure in order to conduct exposure and risk assessments for children?

The Scientific Approach

Research to answer this question has focused on the exposure factors that make children's exposure different from adults. In the process of conducting risk assessments, parameters (inputs) have been identified that are child-specific. Children are often more heavily exposed to environmental contaminants than adults on a weight/weight basis. Children's activities and behaviors can also put them at risk from environmental contaminants.

As a result of recognizing the need to explore children's exposure factors, the Exposure Factors Program, with input from the U.S. Environmental Protection Agency (U.S. EPA) and the scientific community, assembled the *Child-Specific Exposure Factors Handbook* (CSEFH, 2000 interim final). The *Handbook* provides a summary of statistical data on various exposure factors used in assessing children exposures. Some of these factors include drinking water consumption; soil ingestion and mouthing behavior; inhalation rates; dermal factors, including skin surface area and soil adherence factors; consumption of retail and home-grown foods; breast milk intake; and activity pattern data. A colloquium was held in June 2004 to bring together representatives of all Agency constituents and prioritize the research needs. Data from the interim final *Child-Specific Exposure Factors Handbook* is being reanalyzed to ensure consistency with the recommended age groups from the draft document (2003). An Agency-wide exposure factors advisory group was established to identify research needs and set priorities on exposure factors research. A soil ingestion workshop is planned in the spring of 2005 to discuss the state of the science and develop research needs in this area.

Many experienced U.S. EPA risk assessors noted that technical direction was needed on the appropriate age groups to consider when assessing childhood exposure and potential dose to environmental contaminants. In July 2000, the Risk Assessment Forum held a workshop to

examine developmental factors and how they influence the assessment of childhood exposure. The report was called a Summary Report of the Technical Workshop on Issues Associated with Considering Developmental Changes in Behavior and Anatomy When Assessing Exposure to Children. The participants concluded that age groupings (or bins) can be useful as guides for the development of environmental exposure scenarios. A technical issue paper completed in October 2001 reviewed and re-evaluated the data supporting the age groups from the CSEFH (2000) and made recommendations for short-term analyses and longer-term research to improve the database for childhood exposure. A draft Guidance on Selecting the Appropriate Age Groups for Assessing Childhood Exposures to Environmental Contaminants was released for public comment in September 2003, and an external peer review was completed in March 2004.

Impact

The *Handbook* serves as a resource for exposure assessors inside and outside the Agency who need to obtain data on exposure factors to calculate children's exposures. The Age Groups document provides a methodology and rationale for selection of age groups in assessment of children's exposure.

This research program reduces uncertainty in risk assessment by

- Producing and publishing key exposure and exposure factor data (*Exposure Factors Handbook* (EFH) and the *Child-Specific Exposure Factors Handbook*) that are used by Agency and other risk assessors to identify appropriate input parameters for various exposure scenarios in assessing children's risks
- Leading a collaborative effort to develop and provide the consensus on criteria for selecting age groups that are generally applicable to all risk assessments involving children's exposures
- Collaborating with federal and non-federal risk assessors to identify data gaps and prioritize research needs for periodically updating these important handbooks and advisory documents.